



U.S. Department
of Transportation

Federal Highway
Administration

400 Seventh St., S.W.
Washington, D.C. 20590

March 30, 2000

Refer to: HSA-CC64

Albert W. Unrath, Sr., P.E.
ALBERT W. UNRATH, INC.
P.O. Box 631
Colmar, PA 189150631

Dear Mr. Unrath:

In your February 28 letter, you requested the Federal Highway Administration's (FHWA) acceptance of your U-MAD 100K truck mounted attenuator (TMA) at the National Cooperative Highway Research Program (NCHRP) Report 350 test level 3 (TL-3). To support your request, you included copies of three test reports prepared by the Transportation Research Center in East Liberty, Ohio, and videotapes of the tests that were conducted. After reviewing the material, Mr. Richard Powers of my staff requested additional drawings of your TMA. These were delivered to him on March 21.

The U-MAD 100K TMA consists of an aluminum box containing eight separate internal compartments filled with variable density energy-dissipating material. The unit is 3277-mm (129 inches) long, 2286-mm (90 inches) wide and weighs approximately 413 kg (910 pounds), excluding the weight of the mounting bracket and lift mechanism which is 157 kg (346 pounds). A schematic drawing of the U-MAD 100K is shown as Enclosure 1.

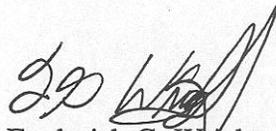
Three NCHRP Report 350 tests were conducted: Test 2-50, Test 3-51, and Test 3-50. Test 2-50 is a 70 km/h head-on impact with the 820 kg car. The TMA support vehicle is blocked to prevent any forward movement in this test. Occupant impact velocity was reported as 11.1 m/s and the subsequent lo-ms ride down acceleration was 9.2 G's. Test 3-51, a 2000 kg pickup truck impacting head-on at 100 km/h, was conducted on January 12, 2000. Occupant impact velocity was reported as 12.0 m/s and the lo-ms ridedown acceleration was 19.1 G's. The support vehicle rolled ahead 6.17 m (20.25 feet) in this test. The final test (3-50), which was the 820-kg car impacting an un-blocked support vehicle head-on at 100 km/h, was conducted on January 28, 2000. Occupant impact velocity was reported to be 12.3 m/s and the lo-ms ridedown acceleration was 15.7 G's. Roll ahead distance for the support vehicle was 4.06 m (13.33 feet).

Since the impact speed in test 3-50 was slightly higher than the nominal 100 km/h, we are willing to accept the occupant impact velocity of 12.3 m/s which is 0.1 m/s higher than we have previously considered to be the limit for acceptance. However, for both this test and test 3-51, the evaluation criteria for occupant impact velocity and ridedown accelerations are at the upper limits recommended by NCHRP Report 350. If impact speeds had been any higher or if the

support vehicle had a test inertial mass heavier than 8613 kg, the U-MAD 100K would not likely have been acceptable at TL-3. Thus, it may be considered acceptable for use on the National Highway System (NHS) at TL-3 provided its support vehicle is no heavier than the 8613-kg truck used for the test. If you wish to mount it on a heavier support vehicle, it must be tested with that vehicle. If mounted on a lighter vehicle, the expected roll ahead distances will be longer and the level of risk to the driver of the support vehicle will be increased. Therefore, it should not be used on a shadow truck significantly lighter than 8613 kg without additional testing.

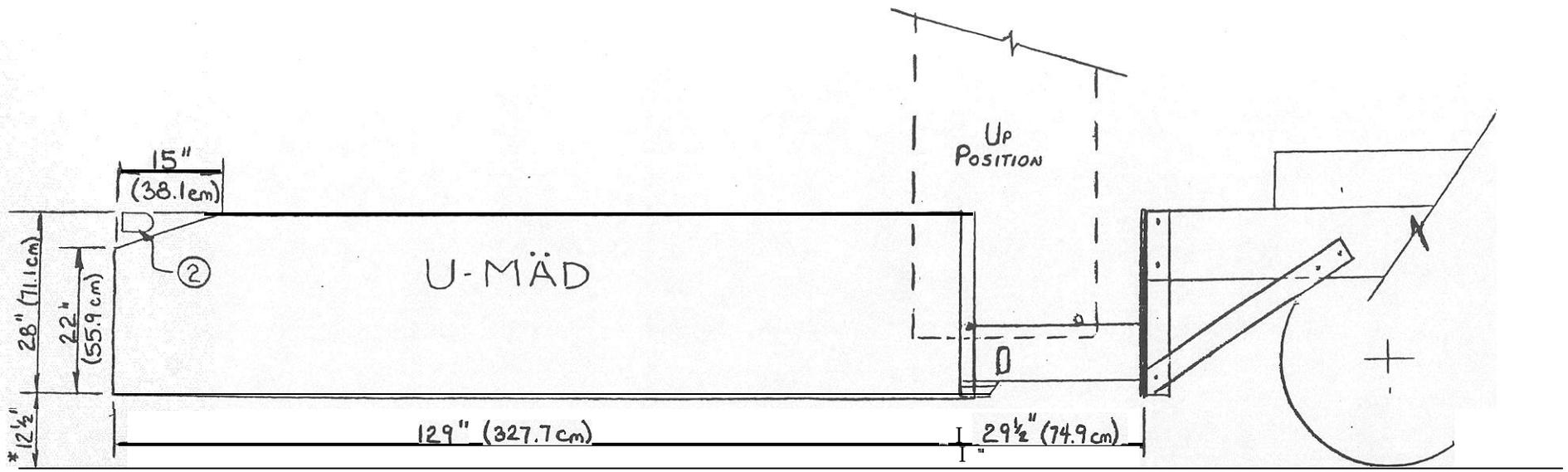
This acceptance is based on the reported crash performance of the U-MAD 100K and is not intended to address the long-term durability of the unit. Further, I am assuming that production models will be identical to the prototype test units. Since the U-MAD 100K is a proprietary product, its use on the NHS is subject to the provisions of Title 23, Code of Federal Regulations, Section 635.411 when such use is specified by the contracting agency. A copy of these provisions is enclosed for your reference. Please contact Mr. Powers at (202) 366-1320 if you have any questions regarding this acceptance letter.

Sincerely yours,



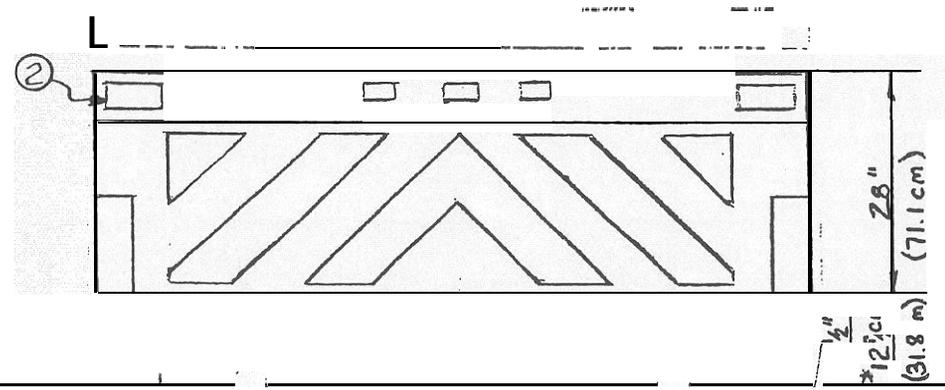
Frederick G. Wright
Program Manager, Safety

2 Enclosures



SIDE VIEW
SCALE 1/2" = 1'-0"

* DESIGN HEIGHT ← MAX -1/2" ± +1"

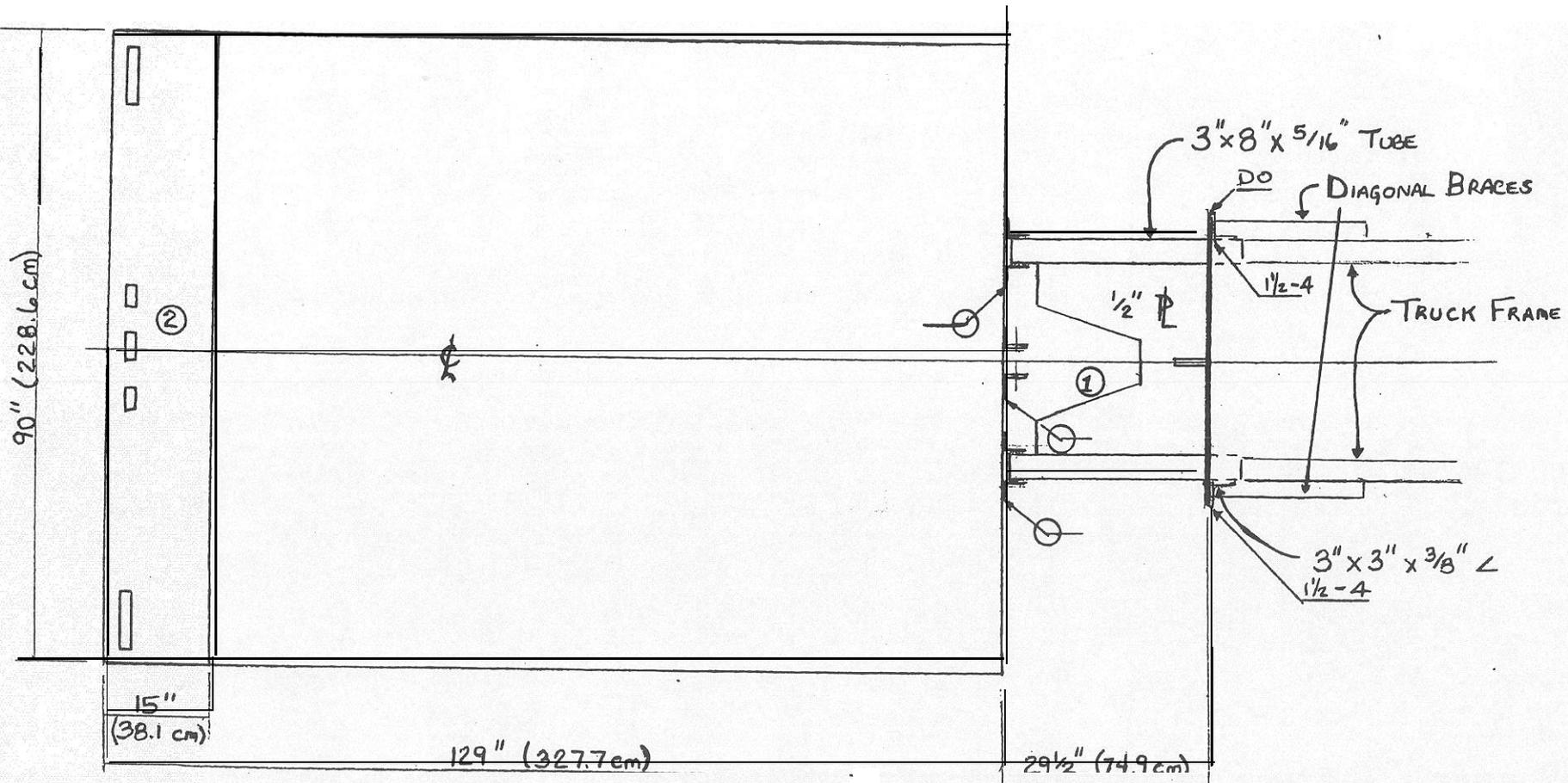


REAR VIEW

ENCLOSURE 1 (1 OF 2)

ALBERT W. UNRATH, INC.
Construction Consultants & Transportation
Safety Equipment Designers

GENERAL LAYOUT



NOTE:

1. CYLINDER & LIFT REMOVED TO SHOW ϕ LAYOUT
2. I.C.C. LIGHTS @ REAR OF CUSHION

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 Construction Consultants & Transportation
 Safety Equipment Designers

TOP VIEW SH 1 of 3 of 4
 SCALE 1/2" = 1'-0"

GENERAL LAYOUT

Sec. 635.411 Material or product selection.

(a) Federal **funds** shall not participate, directly or indirectly, in payment for any premium or royalty on **any** patented or proprietary material, specification, or process specifically set forth in the plans and specifications for a project, unless:

(1) Such patented or proprietary item is purchased or obtained through competitive bidding with equally suitable unpatented items; or

(2) The **State highway** agency certifies either that **such** patented or proprietary item is essential for **synchronization** with existing highway facilities, or that no equally suitable alternate exists; or

(3) Such patented or proprietary item is used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes.

(b) When there is available for purchase more than one nonpatented, nonproprietary material, semifinished or **finished** article or product that will **fulfill** the requirements for an item of work of a project and these available materials or products are judged to be of satisfactory quality and equally acceptable on the basis of engineering analysis and the anticipated prices for the related item(s) of work are estimated to be approximately the same, the **PS&E** for the project shall either contain or include by reference **the** specifications for each such material or product that is considered acceptable for incorporation in the work. If the State highway agency wishes to substitute some other acceptable material or product for the material or product designated by the successful bidder or bid as the lowest alternate, and such substitution results in an increase in costs, there will not be Federal-aid participation in any increase in costs.

(c) A State highway agency may require a specific material or product when there are other acceptable materials and products, when such specific choice is approved by the Division Administrator as being in the public interest. When the Division Administrator's approval is not obtained, the item will be nonparticipating unless bidding procedures are used that establish the unit price of each acceptable alternative. In this case Federal-aid participation will be based on the lowest price so established.

(d) Appendix A sets forth the FHWA requirements regarding (1) the specification of alternative types of **culvert** pipes, and (2) the number and types of such alternatives which must be set forth in the specifications for various types of drainage installations.

(e) Reference in specifications and on plans to single trade name materials will not be approved on **federal-aid contracts**.